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RESERVE

*FOREST PRODUCTS LABORATORY
LIST OF PUBLICATIONS
ON
MODIFIED WOODS, PAPER-BASE LAMINATES,
AND REINFORCED PLASTIC LAMINATES*

DECEMBER 1966

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Symbols and abbreviations used. --For the sake of brevity in the column "Publications and Date," the following abbreviations have been used:

- ASTM - American Society for Testing and Materials (1916 Race St., Philadelphia, Pa. 19103).
- CFSTI - Clearinghouse for Federal Scientific and Technical Information, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Va. 22151.
- FPL - Forest Products Laboratory
- GPO - Government Printing Office
- NACA - Now NASA, NASA Scientific & Technical Information Facility (P. O. Box 5700, Bethesda, Md.).
- Rev. - Revised.
- R&R - Reviewed and reaffirmed.
- USDA - U.S. Department of Agriculture.
- USFS - U.S. Forest Service
- WADC)
- WADD)
- ASD) - Publications by Air Force Materials Laboratory, Research
- ML) & Technology Division, Air Force Systems Command,
- RTD) available from Clearinghouse for Federal Scientific and
- AFML) Technical Information.

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FOREWORD

Scope. --This is a partial listing of literature prepared at the U.S. Forest Products Laboratory on modified woods, paper-base laminates, and reinforced plastic laminates. The first two classes of material are essentially modifications of wood or of pulp and paper products. Most of the reports on reinforced plastic laminates are based on laminates reinforced with glass fibers and represent research done in cooperation with Defense Agencies.

Sources of publications

(1) U.S. Forest Products Laboratory

Publications without an asterisk (*) are available for distribution from this Laboratory. Single copies may be obtained free upon request to the Director, Forest Products Laboratory, Madison, Wis. 53705.

The Laboratory reserves the right to furnish only those publications which in its judgment will give the information requested. Blanket requests or requests for a large number of copies of any individual article will not be filled except in unusual cases.

Publications available elsewhere are marked with asterisks.

(2) Superintendent of Documents, Government Printing Office, Washington, D. C. 20402.

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(4) Libraries may be the only available source for many trade journal articles and for publications out of print.

Title	:	Author	:	Publication and date

MODIFIED WOODS AND PAPER-BASE LAMINATES

General

Modified woods and paper-base laminates.	: Forest Products Laboratory	: Separate from Wood Handbook. USDA Agr. Handb. 72. 1955.
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Pulp, Paper, and Lignin Plastics

Preparation of lignin-filled paper for laminated plastics,	:	: FPL Rep. 1577. 1944. Rev. 1957.
Factors affecting the strength of papreg: Some strength properties at elevated and subnormal temperatures.	: Meyer, H. R., & Erickson, E. C. O.	: FPL Rep. 1521. 1956.
*Supplement: Effect of accelerated weathering on certain strength properties of papreg:	: Meyer, H. R., & Erickson, E. C. O.	: FPL Rep. 1521-A. 1945. Out of print.
Supplement: Effect of moisture on certain strength properties of papreg.	: Meyer, H. R., & Erickson, E. C. O.	: FPL Rep. 1521-B. 1945. R&R 1956.
Supplement: Effect of repeated cycles of freezing and thawing on certain strength properties of papreg.	: Meyer, H. R., & Erickson, E. C. O.	: FPL Rep. 1521-C. 1945. R&R 1956.
*The gluing of laminated paper plastic (papreg).	: Eickner, H. W.	: FPL Rep. 1348. 1955. Out of print.
Low-resin-content and resin free pulp plastics.	: Schwartz, S. L., Pew, J. C., & Meyer, H. R.	: FPL Rep. 1483. 1953. R&R 1965.
Physical and mechanical properties of lignin-filled laminated paper plastics.	:	: FPL Rep. 1579. 1948. R&R 1962.

Title	:	Author	:	Publication and date
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MODIFIED WOODS AND PAPER-BASE LAMINATES (continued)

Pulp, Paper, and Lignin Plastics (continued)

Durability of papreg-to-papreg and papreg-to-birch glue joints.:	:Eickner, H. W.	:FPL Rep. 1538. 1945.
		: R&R 1962.
*Pulps for pulp-reinforced plastics.	:Schwartz, S. L.,	:FPL Rep. 1472. 1945.
	: Pew, J. C., &	: Out of print.
	: Meyer, H. R.	:
*Pulp-reinforced plastics.	:Schwartz, S. L.,	:FPL Rep. 1461. 1945.
	: Pew, J. C., &	: Out of print.
	: Meyer, H. R.	:
	:	:
Certain properties of papreg as affected by laminating pressure, resin content, and volatile content.	:Seidl, R. J.,	:FPL Rep. 1394. 1943.
	: Mackin, G. E., &	: R&R 1962.
	: Baird, P. K.	:
	:	:
	:	:
*Strength and related properties of Forest Products Laboratory laminated paper plastic (Papreg) at normal temperatures.	:Erickson, E. C. O.,	:FPL Rep. 1319. 1943.
	: & Boller, K. H.	: Out of print.
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Stabilized Wood and Wood-Resin Laminates

Basic properties of yellow birch laminates modified with phenol and urea resins.	:Forest Products Laboratory	:USFS Res. Note FPL-0140. 1966.
	:	:
	:	:
Forest Products Laboratory resin-treated wood (impreg).	:Stamm, A. J., &	:FPL Rep. 1380. 1942.
	: Seborg, R. M.	: Rev. 1962.
	:	:
Modified woods.	:Stamm, A. J.	:FPL Rep. 2192. Rev. 1962.
	:	:
	:	:
Acetylated wood.	:Tarkow, Harold,	:FPL Rep. 1593. 1955.
	: Stamm, A. J., &	: R&R 1960.
	: Erickson, E. C. O.	:

Title

Author

Publication and date

MODIFIED WOODS AND PAPER-BASE LAMINATES (continued)

Stabilized Wood and Wood-Resin Laminates (continued)

Staybwood: heat-stabilized wood.	:Stamm, A. J.,	:FPL Rep. 1621. Rev.
	: Burr, H. K., &	: 1955. R&R 1964.
	: Kline, A. A.	:
	:	:
Application of impreg for	:Seborg, R. M. &	:Forest Prod. J. Oct.
patterns and die models.	: Vallier, A. E.	: 1954. Woodworking
	:	: Dig. Nov. 1954.
	:	:
Mechanical properties of	:Erickson, E. C. O.	:FPL Rep. 1639. 1947.
laminated modified wood.	:	: Rev. 1952. R&R 1959.
	:	:
*Hardness modulus of wood as a	:Weatherwax, R. C.,	:ASTM Bull. (153), 84
function of specific gravity.	: Erickson, E. C. O.	: (Aug. 1948).
	: & Stamm, A. J.	:
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Heat-stabilized wood (staypak).	:Seborg, R. M.,	:FPL Rep. 1580. 1944.
	: Millett, M. A., &	: Rev. 1962.
	: Stamm, A. J.	:
	:	:
The electrical resistivity of	:Weatherwax, R. C.,	:FPL Rep. 1385. 1943.
resin-treated wood (impreg and	: & Stamm, A. J.	: R&R 1963.
compreg), hydrolyzed-wood	:	:
sheet (hydroxylin), and	:	:
laminated resin-treated paper	:	:
(papreg).	:	:
	:	:
Influence of manufacturing	:Millett, M. A.,	:FPL Rep. 1386. 1943.
variables on the impact	: Seborg, R. M., &	: R&R 1962.
resistance of resin-treated	: Stamm, A. J.	:
wood.	:	:
	:	:
Forest Products Laboratory	:Stamm, A. J., &	:FPL Rep. 1381. 1942.
resin-treated, laminated,	: Seborg, R. M.	: R&R 1960.
compressed wood (compreg).	:	:

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REINFORCED PLASTIC LAMINATES

Basic Mechanical Properties

Interlaminar properties of five plastic laminates.	:Kimball, K. E.	:FPL Rep. 1890. 1962.
	:	:
	:	:
Relationship between thickness and mechanical properties of several glass-fabric-base plastic laminates.	:Kimball, K. E.	:FPL Rep. 1885. 1962.
	:	:
	:	:
	:	:
Effect of thickness on the mechanical properties of glass-fabric-base plastic laminates.	:Youngs, R. L.	:FPL Rep. 1873. 1960.
	:	:
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	:	:
Effect of tensile and compressive preloading on tensile, compressive, and shear properties of a glass-fabric-base epoxy laminate.	:Kimball, K. E.	:FPL Rep. 1870. 1959.
	:	:
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*Effect of thickness on strength of epoxy and phenolic laminates reinforced with glass fabric.	:Boller, K. H.	:WADC TR 56-522.
	:	: 1957. CFSTI (PB131 044).
	:	:
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	:	:
Poisson's ratio for glass-fabric-base plastic laminates.	:Youngs, R. L.	:FPL Rep. 1860. 1957.
	:	:
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*Mechanical properties of polyester laminates reinforced with high modulus glass fabric.	:Werren, Fred	:WADC TR 56-206.
	:	: 1956. CFSTI (PB 121 683).
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*Interlaminar shear strength of glass-fiber-reinforced plastic laminates.	:Werren, Fred, & : Heebink, B. G.	:FPL Rep. 1848. 1955. : Out of print.
	:	:
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Supplement.	:Youngs, R. L.	:FPL Rep. 1848-A.
	:	: 1956. R&R 1962.

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REINFORCED PLASTIC LAMINATES (continued)

Basic Mechanical Properties (continued)

Effect of thickness on strength of glass-fabric-base plastic laminates.	:Boller, K. H.	:FPL Rep. 1831. 1954.
	:	: R&R 1959.
	:	:
	:	:
Bolt-bearing properties of glass-fabric-base plastic laminates.	:Werren, Fred	:FPL Rep. 1824. 1951.
	:	: R&R 1958.
	:	:
Supplement.	:Youngs, R. L.	:FPL Rep. 1824-A.
	:	: 1955. R&R 1960.
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Supplement: Effect of laminate thickness.	:Youngs, R. L.	:FPL Rep. 1824-B.
	:	: 1955. R&R 1960.
	:	:
*Supplement.	:Youngs, R. L.	:FPL Rep. 1824-C.
	:	: 1957. Out of print.
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Mechanical properties of plastic laminates.	:Werren, Fred	:FPL Rep. 1820. 1951.
	:	: R&R 1958.
	:	:
Supplement.	:Werren, Fred	:FPL Rep. 1820-A.
	:	: 1953. R&R 1960.
	:	:
Supplement.	:Werren, Fred	:FPL Rep. 1820-B.
	:	: 1955. R&R 1960.
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Supplement.	:Youngs, R. L.	:FPL Rep. 1820-C.
	:	: 1956. R&R 1962.
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Supplement.	:Stevens, G. H.	:FPL Rep. 1820-D.
	:	: 1958.
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Effect of prestressing in tension or compression on the mechanical properties of two glass-fabric-base plastic laminates.	:Werren, Fred	:FPL Rep. 1811. 1950.
	:	: R&R 1957.
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REINFORCED PLASTIC LAMINATES (continued)

Basic Mechanical Properties (continued)

Effect of prestressing in tension:	Werren, Fred	:
or compression on the mechan-	:	:
ical properties of two glass-	:	:
fabric-base plastic laminates.	:	:
(continued)	:	:
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*Supplement.	Werren, Fred	:FPL Rep. 1811-A. 1951.
	:	: Out of print.
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Effect of span-depth ratio and	Werren, Fred	:FPL Rep. 1807. 1949.
thickness on the mechanical	:	: R&R 1960.
properties of a typical glass-	:	:
fabric-base plastic laminate as	:	:
determined by bending tests.	:	:

Fatigue and Creep

*Fatigue strength of plastic	Boller, K. H.	:AFML-TR-64-403.
laminates reinforced with un-	:	: 1965. CFSTI (AD 466 520).
woven "S" glass fibers.	:	:
	:	:
*Effect of pre-cyclic stresses	Boller, K. H.	:ML-TDR-64-168.
on fatigue life of plastic lami-	:	: 1964. CFSTI (AD 606 769).
nates reinforced with unwoven	:	:
fibers.	:	:
	:	:
*Effect of tensile mean stresses	Boller, K. H.	:ML-TDR-64-86. 1964.
on fatigue properties of	:	: CFSTI (AD 605 412).
plastic laminates reinforced	:	:
with unwoven glass fibers.	:	:
	:	:
Fatigue strength of phenolic	Stevens, G. H.	:USFS Res. Note FPL-
laminates from 1 to 10 million	:	: 027. 1964.
cycles of repeated load.	:	:
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*Resume of fatigue characteris-	Boller, K. H.	:ASD TDR 63-768.
tics of reinforced plastic	:	: 1963. CFSTI (AD 430 504).
laminates subjected to axial	:	:
loading.	:	:

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REINFORCED PLASTIC LAMINATES (continued)

Fatigue and Creep (continued)

Fatigue test of phenolic laminate at high stress levels and elevated temperatures.	:Stevens, G. H.	:FPL Rep. 1884. 1961.
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Stress-rupture evaluation of glass-reinforced plastic laminates.	:Boller, K. H.	:FPL Rep. 2228. 1961.
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Application of Prot test method to stress-rupture curves of glass-reinforced plastic laminates.	:Boller, K. H.	:FPL Rep. 2118. 1958.
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Effect of long-term loading on glass-reinforced plastic laminates.	:Boller, K. H.	:FPL Rep. 2039. 1955.
	:	: Rev. 1958.
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Tensile stress-rupture and creep characteristics of two glass-fabric-base plastic laminates.	:Boller, K. H.	:FPL Rep. 1863. 1957.
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*Fatigue properties of various glass-fiber reinforced plastic laminates.	:Boller, K. H.	:WADC TR 55-389.
	:	: 1956. CFSTI (PB 121 500).
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Stress-rupture tests of a glass-fabric-base plastic laminate.	:Boller, K. H.	:FPL Rep. 1839. 1953.
	:	: R&R 1959.
	:	:
	:	:
Fatigue tests of glass-fabric-base laminates subjected to axial loading.	:Boller, K. H.	:FPL Rep. 1823. 1952.
	:	: R&R 1958.
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Supplement.	:Boller, K. H.	:FPL Rep. 1823-A.
	:	: 1954. R&R 1960.

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REINFORCED PLASTIC LAMINATES (continued)

Fatigue and Creep (continued)

Fatigue tests of glass-fabric-	:Boller, K. H.	:
base laminates subjected to	:	:
axial loading. (continued)	:	:
	:	:
*Supplement.	:Werren, Fred	:FPL Rep. 1823-B.
	:	: 1956. Out of print.
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Supplement: Effect of notches.	:Kimball, K. E.	:FPL Rep. 1823-C.
	:	: 1958.

Strength and Elastic Properties

Tensile properties of glass-	:Erickson, E. C. O.	:FPL Rep. 1853. 1955.
fabric laminates with lami-	: & Norris, C. B.	: R&R 1960.
nations oriented in any way.	:	:
	:	:
Mechanical properties of a	:Werren, Fred, &	:FPL Rep. 1841. 1953.
laminate designed to be	: Norris, C. B.	: R&R 1959.
isotropic.	:	:
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Mechanical properties of cross-	:Freas, A. D., &	:FPL Rep. 1821. 1951.
laminated and composite glass-	: Werren, Fred	: R&R 1961.
fabric-base plastic laminates.	:	:
	:	:
Supplement.	:Freas, A. D., &	:FPL Rep. 1821-A.
	: Werren, Fred	: 1953. R&R 1959.
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Strength of orthotropic materials	:Norris, C. B.	:FPL Rep. 1816. 1950.
subjected to combined stresses.	:	: R&R 1962.
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*Directional properties of glass-	:Werren, Fred, &	:FPL Rep. 1803. 1949.
fabric-base plastic laminate	: Norris, C. B.	: Out of print. CFSTI
panels of sizes that do not	:	: (PB 104 449).
buckle.	:	:
	:	:
Supplement.	:Werren, Fred	:FPL Rep. 1803-A.
	:	: 1950. R&R 1962.
	:	:
*Supplement.	:Freas, A. D., &	:FPL Rep. 1803-B.
	: Werren, Fred	: 1955. Out of print.

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REINFORCED PLASTIC LAMINATES (continued)

Strength and Elastic Properties (continued)

*Directional properties of glass-	Werren, Fred, &	:
fabric-base plastic laminate	Norris, C. B.	:
panels of sizes that do not	:	:
buckle. (continued)	:	:
Supplement.	Werren, Fred, &	FPL Rep. 1803-C.
	Gish, Marvin	: 1957.

Temperature Effects

*Effect of thermal cycling on	Stevens, G. H.	USFS Res. Pap. FPL
tensile and compressive	:	: 37. 1965. Out of
strength of reinforced plastic	:	: print. CFSTI (AD 621 576).
laminates.	:	:
*Strength properties of rein-	Boller, K. H.	ML-TDR-64-167. 1964.
forced plastic laminates at	:	: CFSTI (AD 606 787).
elevated temperatures (Vibrin	:	:
135 resin and 181-Garan glass	:	:
fabric).	:	:
*Strength properties of rein-	Boller, K. H.	RTD-TDR-63-4154.
forced plastic laminates at	:	: 1964. CFSTI (AD 437 789).
elevated temperatures (Epoxy	:	:
resin ERSB-0111 and 181-	:	:
All100 glass fabric).	:	:
*Strength properties of rein-	Boller, K. H.	RTD TDR 63-4091.
forced plastic laminates at	:	: 1964. CFSTI (AD 430 503).
elevated temperatures (Narmco:	:	:
534 resin and 181-All100 glass	:	:
fabric).	:	:
*Effect of elevated tempera-	Boller, K. H.	ASD TDR 62-629. 1962.
tures on strength properties of	:	: CFSTI (AD 291 485).
reinforced plastic laminates.	:	:
Effect of infrared heat on 45°	Boller, K. H.	FPL Rep. 1879. 1961.
tensile strength of two rein-	:	:
forced phenolic laminates.	:	:

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REINFORCED PLASTIC LAMINATES (continued)

Temperature Effects (continued)

Predicting the strength of reinforced plastic laminates with temperature gradients.	:Boller, K. H.	:FPL Rep. 1881. 1961.
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Effect of thermal gradients on the strength properties of phenolic and silicone reinforced plastic laminates.	:Kimball, K. E.	:FPL Rep. 1878. 1960.
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Other Factors Affecting Properties

*Weathering of glass reinforced plastics.	:Picatinny Arsenal	:Plastec Rep. 24. 1966.
	:	: Plast. Tech.
	:	: Evaluation Center,
	:	: Dover, N. J. (Also
	:	: available CFSTI)
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Effects of aging on the compressive properties of glass-fabric-base polyester laminates.	:Kimball, K. E.	:FPL Rep. 1882. 1961.
	:	:
	:	:
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*Effects of various methods of wet conditioning on the strength properties of several glass-fabric-reinforced plastic laminates.	:Munthe, B. P., & Youngs, R. L.	:WADC TR 58-486.
	:	: 1959. CFSTI (PB 168 478).
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Effects of tensile preloading and water immersion on flexural properties of a polyester laminate.	:Youngs, R. L.	:FPL Rep. 1856. 1956.
	:	: R&R 1962.
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Supplement.	:Youngs, R. L.	:FPL Rep. 1856-A.
	:	: 1957.

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REINFORCED PLASTIC LAMINATES (continued)

Other Factors Affecting Properties (continued)

*Weathering of glass-fabric-base plastic laminates.	:Werren, Fred, & : Heebink, B. G.	:WADC TR 55-319. : 1956. CFSTI (PB 121 390).
	:	:
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*Supplement 4: Effects of weathering on the mechanical properties of four reinforced plastic laminates.	:Kimball, K. E.	:WADC TR 55-319, : Sup. 4. 1962. CFSTI : (AD 291 661).
	:	:
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*Effect of certain fabricating variables on plastic laminates and plastic honeycomb sandwich construction.	:Heebink, B. G., : Werren, Fred, & : Mohaupt, A. A.	:FPL Rep. 1843. 1953. : Out of print.
	:	:
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*Effect of different catalysts and amounts of styrene monomer on strength and durability of glass-cloth plastic laminates.	:Mohaupt, A. A., & : Freas, A. D.	:FPL Rep. 1825. 1952. : Out of print.
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Effect of defects on the tensile and compressive properties of a glass-fabric-base plastic laminate.	:Werren, Fred, & : Heebink, B. G.	:FPL Rep. 1814. 1950. : R&R 1960.
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Effect of moisture absorption on flexural properties of a glass-fabric-polyester laminate.	:Boller, K. H.	:FPL Rep. 1819. 1950. : R&R 1962.
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Miscellaneous

*Tension testing the unwoven fiber composite.	:Romstad, Karl	:Reinforced Plastics. : Nov.-Dec. 1965.
	:	:
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*Compression testing the unwoven fibre composite.	:Romstad, Karl	:Reinforced Plastics. : Sept.-Oct. 1965.
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Title	:	Author	:	Publication and date
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REINFORCED PLASTIC LAMINATES (continued)

Miscellaneous (continued)

Thermal conductivity-tempera- ture relationship for nine glass and asbestos fiber-reinforced aircraft plastics.	:Lewis, W. C. : : : :	:USFS Res. Pap. FPL : 36. 1965. : : :
Investigation of methods for evaluating unwoven glass-fiber- reinforced plastic laminates in flexure.	:Romstad, Karl : : : :	:USFS Res. Note FPL- : 024. 1964. : : :
Methods for evaluating shear strength of plastic laminates reinforced with unwoven glass fibers.	:Romstad, Karl : : : :	:USFS Res. Note FPL- : 033. 1964. : : :
Methods for evaluating tensile and compressive properties of plastic laminates reinforced with unwoven glass fibers.	:Romstad, Karl : : : :	:USFS Res. Note FPL- : 052. 1964. : : :
Dimensional stability of glass- cloth-reinforced laminates.	:Heebink, B. G. : : :	:FPL Rep. 1858. 1956. : R&R 1962. : :
*Curing of void-free glass-cloth- reinforced laminates at room temperature.	:Heebink, B. G. : : :	:WADC TR 55-31. : 1955. CFSTI (PB 111 823). : :

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- RESEARCH PROJECT LOCATIONS

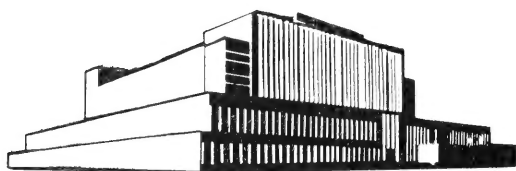
INSTITUTE OF
TROPICAL FORESTRY

PUBLICATION LISTS ISSUED BY THE
FOREST PRODUCTS LABORATORY

The following lists of publications deal with investigative projects of the Forest Products Laboratory or relate to special interest groups and are available upon request:

Architects, Builders, Engineers, and Retail Lumbermen	Growth, Structure, and Identification of Wood
Box, Crate, and Packaging Data	Logging, Milling, and Utilization of Timber Products
Chemistry of Wood	Mechanical Properties of Timber
Drying of Wood	Modified Woods, Paper-Base Laminates, and Reinforced Plastic Laminates
Fire Protection	Sandwich Construction
Fungus and Insect Defects in Forest Products	Thermal Properties of Wood
Furniture Manufacturers, Woodworkers, and Teachers of Woodshop Practice	Wood Fiber Products
Glue and Plywood	Wood Finishing Subjects
	Wood Preservation

Note: Since Forest Products Laboratory publications are so varied in subject matter, no single catalog of titles is issued. Instead, a listing is made for each area of Laboratory research. Twice a year, January 1 and July 1, a list is compiled showing new reports for the previous 6 months. This is the only item sent regularly to the Laboratory's mailing roster, and it serves to keep current the various subject matter listings. Names may be added to the mailing roster upon request.



FOREST PRODUCTS LABORATORY

